REDUCING FACILITY OPERATIONAL COSTS THROUGH PERFORMANCE CONTRACTING

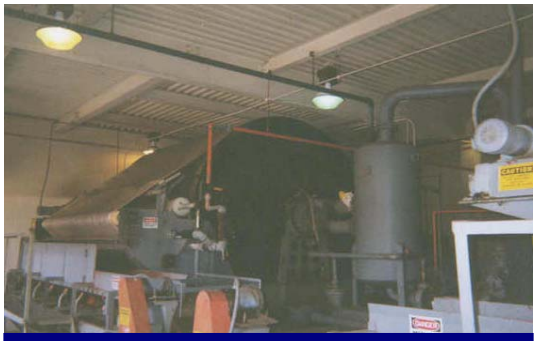
Summary

A $1.1-million improvements program that will reduce Plainville, Connecticut's Water Pollution Control Facility's operating and maintenance expenses by $150,000 annually has recently been completed at no up-front cost to the Town.

The project was performed as a *performance contract* where project lease financing payments are paid from the savings generated. The improvements included new process equipment and system improvements to reduce sludge disposal costs, electrical and fuel oil energy consumption, and maintenance costs. A life cycle analysis for each improvement was an integral part of the evaluation process to evaluate project cost effectiveness. Maintenance, energy, chemical and labor costs as well as financing, design and administrative expenses were considered in this analysis.

Background

The Town of Plainville, located west of Hartford, has successfully operated a wastewater collection and treatment system since 1950. The facility went through a major expansion in 1980. However, due to industries leaving the area and the high cost of energy, the Town was forced to abandon several of the processes due to high maintenance and energy-intensive equipment.



High Energy Vacuum Filters

With over 20 years since the last major facility improvement, the Town was looking for an approach to cost effectively invest in new equipment that would provide long term savings. Most engineering firms could provide traditional evaluation and design services for a fee, but the Town was interested in a more creative solution that included:

- A comprehensive project that would include systems and equipment improvements to reduce energy, sludge, and maintenance costs while improving safety at the facility.
- A financial arrangement that would require no up-front funds from the Town by structuring the project to pay for itself from the savings generated.
- A savings guarantee that would insure the projected savings would be realized.
- One firm that would take sole-source responsibility for the project and had experience identifying cost-savings projects for wastewater facilities, design-build capabilities, and the ability to package the project as a performance contract.

Although privatization of the facility operations would have been an option, the Town had confidence in its staff and felt that performance contracting would be a better solution to help staff reduce costs by upgrading process equipment and facility systems, installing a new SCADA control system, and setting up a new computerized maintenance management system.

Based on this criteria, the Town chose Woodard & Curran (also an experienced contract operator) and Northeast Generation Services to lead this effort. Woodard & Curran, of Cheshire, Connecticut is a full-service environmental consulting firm with engineering and operations experience. Northeast Generation Services, a subsidiary of Northeast Utilities, provided mechanical and electrical construction services for the project. Woodard & Curran worked with facility staff to identify opportunities for savings and develop each project as part of a Feasibility Report.

Project Development

After recognizing the facility savings opportunities through previous site reviews, an *Energy Services*

Agreement was signed with the Town to more fully develop the project. The agreement included the development of a Feasibility Report that consists of the following:

- Working with facility staff to develop cost-effective projects in more detail.
- Providing a preliminary design of the selected projects.
- Developing a detailed cost proposal for designing and constructing the projects.
- Providing detailed savings calculations through a life cycle cost analysis.
- Including a project financing proposal.
- Presenting a cash-flow model of the project over a ten-year period.

Project Financing

Initial project costs were rolled into the financing so they could be recovered after the facility realized the savings. Through the use of a tax-exempt municipal lease, the Town was able to fund the project immediately at a low interest rate with Woodard & Curran guaranteeing that lease payments could be made from the savings generated. Financing was structured to cover all administration and construction costs for a one-year period and then was extended for the ten-year financing period.

Improvements Included in Project

Specific improvements included the installation of a rotary drum thickener to reduce sludge costs, smaller blowers for the post-aeration system, HVAC and lighting efficiency improvements, and safety improvements.

Installation of Rotary Drum Sludge Thickener. A new rotary sludge thickener was installed to remove more water from the sludge generated at the facility. This new process will reduce hauling costs and the number of trips that must be made by sludge haulers to the sludge treatment and disposal site. This improvement includes the installation of two new odor control systems, modifying existing pumping and piping systems, and a new SCADA control system that automatically cycles 16 motor operated sludge inlet valves. The new equipment will reduce sludge disposal costs by approximately $125,000 annually.

New Rotary Drum Thickener

Replacing 100-hp Blowers with 50-hp Units. To reduce energy costs, the evaluation team immediately focused on the 100-hp-post aeration system blowers. These blowers had previously been used for the aerobic digesters and now operated continuously to provide air to the post-aeration diffusers. The units were oversized for the application and produced dissolved oxygen levels far above the required 6.5 mg/l for this system. To improve this system, two 50-hp blowers equipped with variable speed drives and an automated dissolved oxygen control system were installed. The designed system was optimized further during the installation process when Rich Tingle, Lab Technician at the Plainville WPCF, suggested that the probe be placed further downstream to take advantage of the air introduced from a drop in elevation in the effluent channel. This recommendation has increased savings even higher than the original savings estimate of $25,000 annually.

New Dissolved Oxygen Probe

HVAC and Lighting Improvements. As part of the project, HVAC upgrades were also made to improve efficiency and increase ventilation where needed to create a safe work environment. These projects included the replacement of an old boiler (previously used for anaerobic digester heating but now used for only space heating) with a new smaller, more efficient boiler and the addition of new ventilation systems in the sludge thickening and storage areas. An independent HVAC unit was installed in the lab to ensure testing was done in accordance with standard methods. All lighting was also upgraded to high efficiency fixtures.

Other Project Benefits

In addition to the cost-savings projects, Bob Jahn, Director of Environmental Services for the Town and Jan Marineau, Plant Superintendent, identified the need to include safety improvements to increase the level of staff emergency preparedness. These projects included:

- Repairing handrails and grating and adding toeboards to tanks to comply with OSHA safety standards, and the creation of an Integrated Contingency Plan that includes emergency response procedures, reviewing storage of hazardous materials, internal notification procedures, and inspection and preventive maintenance procedures.
- Implementation of a new maintenance management system (MP-2 program) that is designed to track maintenance costs and equipment information, schedule preventive maintenance, and provide detailed task information. The maintenance system provided an important step towards complying with the EPA's proposed CMOM (Capacity, Management, Operating and Maintenance) requirements, and the new financial reporting rules in Government Accounting Standards Board Statement 34 (GASB 34) for wastewater collection systems.

Summary

In addition to reducing operational costs, the Town worked closely with Woodard & Curran to adopt an attitude of conservation throughout the project. This included reusing existing piping, pumps, tanks and valves where possible, purchasing products made from recycled materials, and creating an overall reduction in annual power plant emissions by over 400,000 pounds in air emissions based on the project kWh energy savings. The sludge thickening project also helped lower emissions by reducing the number of tanker truck loads required to haul sludge off-site from twelve trips per week, down to three.

The Plainville O&M Project is an excellent example of how a municipality was able to use the performance contracting approach to make facility improvements and reduce costs without up front capital funds. Over the projected 20- year equipment life (accounting for conservative energy and maintenance escalation figures) Plainville is expected to save over $2 million in operational costs after paying for all project expenses.